
PW4 : Physicochemical transformations in confectionery

I. Objectives

- Understand and observe key transformations : gelation, crystallization, Maillard reaction, sugar inversion, caramelization.
- Produce various types of candies while identifying the underlying physical and chemical processes.

II. Materials and reagents

Sugar (sucrose), glucose syrup, honey, gelatin powder or sheets, heavy cream, butter, citric acid or lemon juice, food colorings, flavoring agents, water.

III. Protocol

1. Gummy candies (Gelation)

- Heat 100 mL of water with 150 g of sugar and 50 g of glucose syrup to 60–70°C.
- Add 10 g of pre-soaked gelatin (or 4 g of agar-agar if plant-based).
- Incorporate flavorings and food coloring.
- Pour the mixture into silicone molds.
- Let set in a refrigerator for 2 hours (gelatin) or 30 minutes (agar).

2. Clear sugar glass (Controlled crystallization and caramelization)

- In a saucepan, combine 300 g sugar, 100 g water, and 100 g glucose syrup without stirring.
- Heat the mixture to 150–155°C (hard crack stage).
- Remove from heat and add coloring and flavoring.
- Pour onto an oiled tray or into molds and allow to cool and solidify.

3. Soft caramels (Maillard reaction + caramelization)

- Heat 200 g sugar, 150 mL cream, 100 g honey, and 50 g butter.
- Cook the mixture to 118–122°C (firm ball stage).
- Pour into a mold and allow to cool.

4. Fondant candies (with inverted sugar)

- Dissolve 300 g sugar in 150 mL water and heat to 110°C.
- Add 1 tsp citric acid or a few drops of lemon juice.
- Maintain the temperature for 10–15 minutes (to allow inversion of sucrose).
- Beat the mixture until it becomes opaque and creamy.

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- Identify the type of transformation occurring in each candy-making process.
 - Correlate observed changes (texture, transparency, color, taste) with specific scientific principles.